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ABSTRACT

This paper describes a series of experiments which indicate how different reinforcement systems affect cooperative, competitive, and individualized learning structures. Following a brief literature review of prior research, the experiments investigated (1) individual reinforcement for peer tutoring and (2) shared-group reinforcement for peer tutoring. They examined the effects of reinforcement by demonstrating how reward structures can interact with several independent variables in controlling the frequency of cooperative behavior. The studies support the idea that children from various socioeconomic classes, 3-to 11-years-old, in classrooms of 4-17 members, can work together effectively in cooperative instructional situations involving curriculum materials such as mathematics, vocabulary development, and reading. Also, the results indicate that when appropriate reinforcement is provided for cooperative behavior, helping behaviors as well as student performance are increased. Several research topics are suggested for future research on the development and evaluation of cooperative goal structures. (SDH)

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THE EFFECTS OF DIFFERENT REINFORCEMENT SYSTEMS ON COOPERATIVE BEHAVIORS EXHIBITED BY CHILDREN IN CLASSROOM CONTEXTS

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ABSTRACT

The merits of cooperative, competitive, and individualized learning structures are reviewed. A series of experiments conducted over several years which indicate how different reinforcement systems affect these structures are elaborated. Also discussed are issues for future research.

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The notion of children working cooperatively for purposes of instruction is not a new idea. As early as the first century, Quintilian argued that students could benefit from teaching one another (Gartner, et al., 1971). Johann Amos Comenius (1592-1670) believed that students would benefit both by teaching and being taught by other students (Comenius, 1921). In late eighteenth century England, Joseph Lancaster and Andrew Bell made extensive use of cooperating student groups, and the idea was apparently tried for the first time in the United States when a Lancastrian School was opened in New York City in 1806 (Cubberley, 1934).

In recent years, the idea of cooperating children working in instructional or problem-solving groups of two or more, has enjoyed somewhat of a revival in this country. Some of this recent interest in cooperative groups has undoubtedly been spurred by problems of tight school budgets and overcrowded classrooms, since student teachers can provide instructional assistance without extra cost. A more positive stimulus for the new experimentation, however, has arisen from the belief that group instruction and problem solving may offer significant advantages for students. A complete list of potential advantages is beyond the scope and intent of this paper but we can offer several possibilities (Gartner, et al., 1971; Johnson and Johnson, 1974).

1. Problem solving and overall performance may be better in group than in individual contexts.
2. Group interaction may improve interpersonal and cooperative skills in group members.
3. Social perspective or role taking and empathy may be heightened in group contexts.
4. Instruction from or cooperative problem solving with other students may reduce anxiety caused by status, age, and background

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differences between students and adult teachers. That is tutors may be able to communicate more readily with children who have slow learning rates, or when an adult creates anxiety in a student another child may be a more effective teacher.

5. Other children can provide more individualized instruction, including direct and immediate feedback.
6. Teaching another student may increase understanding as well as build self-confidence, ego strength, and lead to the acquisition of teaching behavior, a general skill that can be very useful in an adult society.
7. The opportunity to teach another student may provide motivation that was absent when a student was responsible only for himself.
8. Peer tutors may be more patient than teachers with children who have slow learning rates.
9. Tutoring may reinforce prior learning, may lead to reformulation, and to deeper understanding of the basic structure of the material.

Few of these potential positive effects have been directly investigated in experimental situations, but there have been a number of evaluative studies designed to test the effectiveness of cooperative tutoring arrangements under controlled conditions (Amaria and Leith, 1969; Cloward, 1967; Etters, 1967; Fraser and Stern, 1970; Gartner, Kohler and Riessman, 1971; Hamblin and Hamblin, 1972; Harris and Sherman, 1972; Harris, Sherman, Henderson, and Harris, 1972; Hassinger and Via, 1969; Lucas, Gaither, and Montgomery, 1968; McWhorter and Levy, 1971; Morgan and Toy, 1970; Niedermeyer,

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1970; Willis, Crowder, and Morris, 1972; Zach, Horner, and Kaufman, 1969). In comparison with most other educational research, where different learning environments or different styles of education make little or no difference for the instructional effectiveness the results of cooperative tutoring is promising (Stephens, 1967). However, it is obvious from the inconsistent results that some tutoring arrangements are more effective than others. Investigators have suggested several reasons for this inconsistency in results, including differences in the training of group members, the age and background of the group members, the amount of time devoted to instruction, and the quality of the instructional materials. One set of potentially powerful factors has generally been neglected, however, in the explanations of differential effects, and that is the goal structure of the learning environment which can function either to facilitate or hinder cooperative tutoring. Johnson and Johnson (1974) have identified three goal structures: individualistic, competitive, and cooperative. Individualistic structures are present when the behaviors and accomplishments of children have no consequences for anyone but themselves. That is, their performance or attainment does not affect the goal attainment of other children. For example, in a completely individualized instructional program or in an individually administered reinforcement program, the success or failure of one child has little or no effect on the evaluation, grades, rewards, or status of other children. In a competitive structure the success or failure of one child clearly affects the chances for success of other children. When children are compared with one another in a system of limited rewards, the success of one clearly reduces the opportunities for goal attain-

revolves around groups rather than individuals. Group members share in the success or failure of the group's performance. A cooperative goal structure should theoretically promote more helping behaviors between children and better tutoring. In individualistic systems, the performance of others is irrelevant to a student's own goal attainment while in a competitive system the success of others threatens one's own achivement. In both of these structures we would expect a low incidence of cooperative behavior. In a cooperative structure, however, the success or failure of individuals has implications for other students in the cooperative group. Thus, if rewards are structured that are contingent upon the group's performance the incidence of cooperative behavior should increase with the proportion of reinforcement that is contingent upon the group's performance.

For our present purposes, one way to conceptualize the goal structure is to focus on the structure of rewards (Kelly and Thibaut, 1969; Coleman, 1968). In a competitive structure where the rewards are limited and comparisons are made between individual children, the success of one individual in gaining maximum rewards reduces the probability of success of others. In an individualistic system, judgment is not made on comparative bases and rewards are distributed according to personal achievement, possibly judged against one's past achievement. In a cooperative system, individual rewards are earned as a consequence of the quality of group work. Student tutoring and related cooperative behavior should be partially dependent on the reward structure of the classroom or learning situation, increasing as the proportion of reinforcement dependent upon group performance increases. Data seem to indicate that cooperative behaviors increase frequently in a cooperative reward structure and are significantly less frequent in a competitive or

individualistic reward structure (Hamblin, Buckholdt, Ferritor, Kozloff, and Blackwell, 1971; Hamblin, Hathaway, and Wodarski, 1971; Wodarski, Hamblin, Buckholdt, and Ferritor, 1972; Wodarski, Hamblin, Buckholdt, and Ferritor, 1973; Wodarski, Hamblin, Buckholdt, and Ferritor, 1974; Johnson and Johnson, 1974).

To date, there have been only a few experiments that focus on the reward structure for the group and the tutoring and other cooperative behaviors between students. Our purpose here is to review several of these experiments conducted by a group at CEMREL in St. Louis over the last few years, and not only to summarize what they tell us about how reward structures relate to effective cooperation, but also to acquaint us with some of the ways that cooperative or tutoring programs may be structured. Moreover, the purpose is to suggest how these reward structures may interact with other variables such as subject area, size of classroom, age, and so forth in controlling the frequency of cooperative behavior and to review future relevant research issues concerning the use of different reinforcement structures to control the frequency of cooperative behavior exhibited by children in classroom contexts.

Individual Reinforcement for Tutoring

The first, a pilot study by Buckholdt and Hamblin (Hamblin, et al., 1971: 57-59), involved twelve first grade children who were from an inner city elementary school in an impoverished area and had been trying to learn the "sounds" that go with various letters of the alphabet over a four week period prior to the experiment . While the other children in their classes had done well enough in group instruction, none of these twelve had learned

period. In the experiment, the children were randomly divided into three groups, and all were randomly assigned tutors from among the other first graders who had been most successful in learning their symbols. Each day the child and his tutor were sent to a small room at the opposite end of the building from the classrooms where they worked with the aid of a Language Master. Alphabet symbols of the sounds (for example "a" or "th") were placed in the upper lefthand corner of a Language Master card. The sound itself plus a word beginning with that sound was recorded on one sound track of the card. For example, if a card had an "m" on the upper lefthand corner, when a child ran the card through the Language Master, he would hear, "m", monkey,"m".

Tutors worked with their tutee in several ways. Sometimes, they would play a game where the tutee gave the sound for the first letter and the tutor took the second letter. At other times, they would simply ask the tutee to give the sound and then run the card through the Language Master to check for accuracy. All tutors kept two piles of cards, one which included the sounds still to be learned and the other sounds not yet known. At the beginning of the study, tutors were instructed to work with the children in the same way regardless of the reinforcement condition. After each of the scheduled twenty-minute periods, an adult tester would arrive to test the pupil. She would hold up each of the thirty-three cards and ask the pupil to identify the sound symbolized on the card. If he identified the appropriate sound within ten seconds, he was given credit for knowing the sound.

There were three reinforcement conditions. In Group A, where both the pupil and the tutor were reinforced according to the tutee's progress in learning the different sounds, six tokens were given if the pupil correctly identified all of the sounds that he had learned to criterion in earlier

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sessions, and two additional tokens were given for each new sound he had learned to criterion. Tokens were used to purchase special activities, such as free classroom time and extra recess time, crackers, sweet dry cereal, toys, and tickets to play recreational games, such as pinball, target shooting, and bowling. Also, each day that the student learned two new sounds, both the pupil and his tutor earned a special prize--a cup of ice cream, a candy bar, or a popsicle. In Group B, the tutors and students were each given eight tokens at the beginning of each of the twenty-minute sessions which they received regardless of their progress. This group, as well as Group A, could trade their tokens for a variety of special privileges or material items. Group C received no tokens or other material reinforcers. Rather, the tutor-student pair simply met every day for their twenty-minute period.

The summary data for the three groups are given in Figure 1. The greatest effect was obtained with Group A, who received the strongest reinforcers for effective learning and indirectly for effective tutoring. Their median was thirty-three sounds learned to criterion (one hundred percent) by the end of the twenty-day experiment. Groups B and C, whose reinforcers for learning and tutoring were given non-contingently, did not do as well. In Group B, the median sounds learned to criterion in twenty-days was twenty-three (or seventy percent); in Group C - 13.5 (or 41 percent).

Figure 1 about here

A similar strategy was used with comparable results by Pfeiffer, Shea, and Hamblin (Hamblin, et al., 1971: 31-34) in an experiment with 16 white

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like that of the previous experiment except the children could work either individually or cooperatively in pairs at the Language Master. In the A periods, a male teacher sat as a nonparticipant observer in the room with the children and with the children and the Language Masters. He did not attend to or respond to the children in any way. The purpose for this was to reduce to zero the reinforcement given by the teacher for tutoring and learning during the A periods, yet control for the presence of an adult. During period Ala, however, reinforcement was given for individual vocabulary gains demonstrated each day in a test after the fifteen-minute learning period and during experimental conditions Alb and A2 for mutual vocabulary gains of cooperating pairs. In the B periods, the teacher walked around the room from one pair of children to another, praising them and handing out tokens which were exchangeable for valued reinforcers if he found them teaching one another but ignoring them if they were not tutoring. Wage reinforcement was also given in the B periods for mutual vocabulary gains of cooperating pairs as in condition Alb and A2. In condition C, tokens were gradually phased-out and the teacher used only praise to reinforce cooperative behavior.

Figures 2 and 3 about here

The data in Figures 2 and 3 indicate that the children tutored each other more and they learned at a faster rate when the teacher intermittently gave them tokens and praise for learning together at the Language Master than they did during the A periods when they were simply reinforced for vocabulary gains. In other words, the data in Figure 2 suggest that these preschoolers would not effectively tutor one another unless intermittent reinforcement for tutoring per se was added to the reinforcement the pairs

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received for passing the test. Furthermore, the data indicate that while the children did not learn from working individually at the Language Masters, the rate of learning increased substantially during the B period when they started tutoring one another.

Hence, this experiment again supports the general hypothesis that effective tutoring and effective learning will increase as the strength of the reinforcers for effective cooperation or tutoring and effective learning increases. However, it represents a nice twist in terms of the design of tutoring programs. There was no stigmatization of the children in this experiment; the children were simply paired and told to teach one another. Under the proper reinforcement conditions they did; in fact, they generally took turns at being the teacher and the pupil.

The third experiment in this series by Stoddard, Bushell and Hamblin (Hamblin, et al., 1971: 37-39) tested the same basic hypothesis, but the situation was somewhat different in that it did not involve Language Masters. Rather, the 17 suburban preschoolers, ages 35-59 months, during a standard 45-minute study period, could choose in all conditions of a BA B AB AC experimental series to work on individual lessons in one area of the classroom with one of two teachers or they would team up in pairs and work in another area of the classroom with a third teacher. Careful records were kept on the progress of each individual child from the beginning and a child who knew a subject was asked to tutor another child who did not. Throughout the A and B conditions, the children had a choice. They would receive teacher approval and tokens for working either individually or in pairs. Furthermore, as they were completing a lesson they were given tokens in proportion to the number of symbols, words, numbers, etc., learned to

criterion. However, in the B condition, the children who were working togethe as tutor-pupil pairs were reinforced differentially. That is, both received a special token when the tutored pupil answered questions correctly on the assigned lesson material. The special token was larger and was made out of more attractive plastic. More importantly, it was worth four of the regular tokens. Condition C was similar to the B condition except the attractiveness of the backup reinforcers, the things the children could buy with their tokens, was increased. Field trips to the local fire station, police station, pet shop, post office, etc., were added to the usual purchasables.

Figure 4 about here

Note in Figure 4 that, in general, the children spent more time in tutor-pupil teams during the B condition when the reinforcement for such activity was increased over what it was in the A condition. Moreover, when the children were reinforced still more in Condition C, by being able to buy more with tokens, they spent still more time tutoring one another. Finally, test performance increased with tutoring; that is, the mean number of test items correctly answered by the pupils increased with the time spent tutoring.

In assigning lessons, the teachers in this experiment attempted to give each child experience both as a pupil and as a tutor. This was not difficult for the progress of any given child was somewhat uneven. Every child did some things better than others and he could generally tutor in areas where he had strengths. For example, it was not uncommon for one child to teach a second his numbers and then the second to teach the first reading. Also, there were two unanticipated benefits from the system. First, the observers were continually amazed at the way the children innovated effective teaching techniques. Second, the children, once they got the "hang of it", seemed to enjoy teaching one another and learning from

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one another. Thus, the situation was unstructured enough to allow the children a great deal of freedom to develop their own approaches to teaching and learning and that freedom to develop, it seems, was fun.

There are some educational experimentors who may be nervous about reversal designs such as those used in the two previous experiments and many believe that the data are confounded since several experimental conditions were investigated through time. In the following experiment conducted during an eight week period, which tested the effects of reinforcement on tutoring and learning (Hamblin and Hamblin, 1972), an analysis of variance design was used involving 32 inner city preschoolers, 26 white and 6 black. The experiment also tested the effects of adult versus peer tutoring.

Figure 5 about here

The results in Figure 5 indicate that tokens for reading and peer tutoring increased the number of books the children were able to read to criterion and that the effects were additive (all interaction terms were insignificant). The high IQ children seemed to benefit more since under the peer tutoring condition they continued to be tutored by adults for 10 minutes each day and they tutored their slower peers for 10 minutes each day--so tutoring time was not constant. Be that as it may, the low IQ children, when they received tokens for reading and were tutored by their peers, did considerably better than the high and medium IQ children when the latter were given tokens for attending and when they were just tutored for 10 minutes by the adults. While these data again suggest that reinforcement for effective tutoring and learning markedly increases the effectiveness of both the tutoring and learning, it also suggests apparently one of the

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are taught by what to them are giants. In addition to being smaller, less frightening and inhibiting, peer tutors generally use a language that peers understand. The late Jules Henry, after observing inner city classrooms over an extended period, suggested that adult teachers tend to talk over the heads of their children. Children, when tutoring their peers, probably do not have that problem. Some may be clumsy teachers at first but our experience has been that given practice and reinforcement for effective tutoring, most children can become rather good teachers. This important finding should be considered when educators decide whether or not to institute peer tutoring. Some children may learn considerably better if they have the opportunity to learn from peers.

Tutoring and Group Contingencies

Bronfenbrenner's (1970) Russian studies suggest that when children are put under group instead of individual contingencies, peer tutoring occurs naturally and because of it, academic achievement is improved over what it might be were the children put under individual contingencies (presumably for the same reinforcers). While Bronfenbrenner cites no experimental data to demonstrate the point, the possibility is intriguing because one of the problems of setting up the conventional tutoring program is that it often requires a considerable amount of classroom management by the teacher in terms of time and energy involved in the organization of the academic tasks and the administration of the reinforcement conditions. If Bronfenbrenner were correct, group contingencies might bypass most of those management problems. Three experiments have recently been done which investigate these matters in some detail. However, before reviewing them, it is necessary to discuss precisely what is meant by group contingencies.

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To most people, group contingencies define a situation where members of a group are reinforced on the basis of the average performance of all of the group members. Thus, if the members of a group averaged 50 percent on a test, they might receive five tokens each (if 10 were the maximum) or if they averaged 90 percent on the test, they might receive nine tokens each. When the performances of all group members are averaged and reinforced, it will be referred to as an average performance group contingency.

Alternatively, the group may be reinforced on the basis of the high performances in the group. Thus, if the top three scores on a test by members of the group averaged 90 percent, all members of the group receive 8 tokens. This contingency is referred to as a high performance group contingency. Additionally, a group may be reinforced on the basis of the low performances in the group. Thus, if the low 3 scores on a test by members of the group average 50 percent, all members of the group might each receive 5 tokens, or if the bottom 3 performances average 70 percent, then each member of the group might receive 7 tokens. This is referred to as low performance group contingency.

These distinctions between average, high and low performance group contingencies may seem unimportant, but theoretically they should lead, and empirically they do lead, to quite different behavioral outcomes. In fact, the purpose of the first experiment by Hathaway and Hamblin (Hamblin, Hathaway, and Wodarski, 1971) was to compare the effects on academic achievement of the average, high, and low performance group contingencies with the effects of two other types of individual contingencies, for performance and for attendance. The experiment involved 5 experimental groups of inner city fourth graders, 3 with 7, 1 with 8, and 1 with 9 members. The groups each spent 3 weeks under each of the experimental conditions which were assigned in counter balanced order during their mathematics, reading and spelling

periods, which lasted for approximately 35 minutes each day. The teacher used the regular curricula material provided by the school district and progress was assessed by calculating standarized gain scores (average progress for the entire class defined the unit) on weekly pre-post tests.

The data in Figures 6 and 7 indicate that the slow and the gifted students had differential reactions. In particular, the gifted students performed best on the high performance group contingency and the slow students performed best on the low performance group contingency. In fact, data suggest that the best performances turned in over the entire experiment were by the slow students under the low performance group contingency. This occurred in part because under such a contingency, the slow students evidently felt considerable motivation since their performance was so crucial to the group outcome. The other reason for their remarkable progress was that the more gifted students spent much of their time tutoring the slower students. Be that as it may, the second best performance turned in by the gifted students was under the low performance group contingency and the data (not shown here because of space limitations) indeed show that on the average the groups, as a whole, did better under the low performance group contingency than under any other.

Figures 6 and 7 about here

The second experiment, by Wodarski, Hamblin, Buckholdt, and Ferritor (Wodarski, et al., 1971), was designed to see if different mixes of individual and low performance group contingencies might be more effective in accelerating academic achievement than was a straight low performance group contingency. Thus there were four experimental conditions, one in which children who were on 100 percent individual contingencies were paid

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a play dollar for each problem they themselves got right, one in which they were on 100 percent low performance group contingency. They were paid a "dollar" for the average of the bottom four performances by members of their group, and there were two intermediate conditions where they were paid a fraction of a "dollar" for their own performance and a fraction of a "dollar" for the average of the bottom four performances of their group. This experiment involved fifth grade inner city children, but only during a 25-minute math period each day. Again the groups were rotated through the experimental conditions in a different counter balanced order. On alternate days in all conditions, the children were told that once they had finished their own work, they could tutor other members of the group if they chose to. Data were gathered on the percent of the time the children spent tutoring after they had completed their work and the rate of improvement on the arithmetic tests as calculated for each of the groups for each of the experimental conditions. These data are presented in Figures 8 and 9. Note that peer tutoring increased markedly as the proportion of group reinforcement increased. Also note that in general the acquisition coefficients also increased as the proportion of group reinforcement increased. Both of these relationships were highly significant statistically. However, further analysis of the data not shown here again suggests that the slower students benefited more than did the more gifted students, that on the average the gifted students did considerably better on the 100 percent low performance group contingencies than they did on the individual contingencies. Apparently working the problems and then tutoring the slower students helped them learn more than they learned by just working the problems as they tended to do under the individual contingencies.

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Figures 8 and 9 about here

The data are rather clear then. At least under low performance group contingencies, children do organize themselves to teach one another, as Bronfenbrenner suggested they might, and their academic achievement improves as a result.

The third experiment employing shared group reinforcement (Buckholdt, et al., 1974) added a dimension of training in skills thought to be useful for effective cooperation on instructional tasks. The 60 students were fourth-graders from schools which serve a poverty-stricken urban neighborhood in a large mid-western city. The experiment was a 2 x 2 randomized design, with the two factors being reinforcement condition (non-contingent reinforcement vs. shared group contingent reinforcement) and tutoring (no training for tutoring vs. training for tutoring). All students were initially tested on a measure of reading comprehension and stratified into low, middle, and high levels. Ten small groups of six members each were then formed within classrooms by randomly assigning two members of each ability level to each group, for a total of six members to each group. Small groups were then randomly assigned to experimental conditions. The group, rather than the individuals, served as the unit of analysis.

All groups worked on a reading assignment for twenty-five minutes a day, three days a week for four weeks for a 25 minute period. The reading exercises were adapted from the SRA reading series. The exercises were geared to the low-middle ability levels and their difficulty level remained approximately the same throughout the study. Students were given practice questions to answer while reading. The purpose of these questions was to provide students with feedback on their understanding of the exercise and

to facilitate either asking for help from other children or giving help. Following the reading period, each student took a 20-item multiple-choice comprehension test. No tutoring or other assistance was permitted during the test.

Before the beginning of the study, the experimenters met with teachers and students to identify reinforcers which were desired by the children and which were generally available to schools without additional costs. A free period in the afternoon to socialize, play cards, and dance were the most popular reinforcers selected. Others included extra time at gym and recess and opportunities to meet popular local sport and entertainment figures.

Children in the non-contingent reinforcement conditions received reinforcement merely for participating in the experiment and not for their performance on the reading exercises. Children in the group-contingent condition received points based on the average score of the group. One point was awarded for each increment above the standard of 20, so that a group with an average of 35 would earn 15 points. The points were exchanged once a week for reinforcers. The more points a group accumulated, the more desirable a reinforcer they could purchase or the longer they could remain in a reinforcing activity. The children in the non-contingent group also received feedback on average group and individual performance as well as points, but their reinforcers did not require an exchange of points.

Children in the "training in tutoring" condition received about a two and one-half hour mini-course in tutoring. The short course included both instruction and role-playing in how to recognize that you need some help, how to ask for help, how to search for others who may need assistance,

and how to provide instruction, feedback, and reinforcement for other students. All students also had supervised practice in both the role of tutor and tutee. The children in the "no-training" condition did not receive this instruction.

Two dependent variables were used; one was a measure of "reading comprehension" and the second was a measure of student "cooperative and tutoring behavior." The reading comprehension measure was calculated from the performance of the several groups during the final three days of the study. The measure of cooperative and tutoring behavior was obtained by observers using a time-sampling checklist used in a previous study (Wodarski, et al., 1972).

Table 1 contains the analysis of variance for the reading comprehension measure. The main effects for both factors are significant (α = .05 level), with group contingency groups outperforming non-contingency groups and trained-tutor groups outperforming groups without training. There was no significant interaction between the two factors.

Table 2 contains the analysis of variance for the tutoring measure. The main effect for both factors are significant (α = .05 level). There was no significant interaction between the two factors.

Table 1 and Table 2 about here

Conclusion

The studies summarized in this paper support the idea that children from various socio-economic classes, between the ages of 3 to 11, in classrooms ranging in size from 4 to 17 members can work together effectively in cooperative instructional situations involving curriculum materials such as

mathematics, vocabulary development, reading, and so forth, and that they can serve as teachers for one another. Moreover, the studies indicate that when appropriate reinforcement is provided for cooperative behavior, helping behaviors as well as student performance can be increased. In more general terms, we are arguing that reinforcement strategies can be used to create a cooperative goal structure for dyads or larger groups of children and that a cooperative goal structure will improve cooperative behavior among children as well as group academic performance.

The implications of these and similar research findings in the effects of cooperative student groups for the design of instructional systems and for the general improvement of educational services are great. Current educational research and innovation projects give major attention to the identification and teaching of so-called essential cognitive skills, to the content and design of curriculum, and to the role and critical skills of the teacher. The social system of the children is generally either neglected or viewed as a passive response to either teacher or curricular control (traditional competitive classrooms), as an active, but individualistic role, in which the child chooses his individual options from available alternatives (open classroom) or develops his own alternative (free schools). Role relationships, however, often do not follow prescribed models. Because an instructional system does not explicitly build-in role relationships between children does not mean that relationships will develop. Or, because the curriculum is individualized, does not mean that children will not compete with one another or develop group norms to hold down performance. The numerous reports of children racing through personalized programs to beat their neighbor should be warning enough. When children come together, a

social system is created, and the norms of the system may not support the formal goals of the school. In fact, there is evidence to indicate that when goal structures are not systematically built into an instructional enviornment, children will adopt the interaction strategies they know best, that is, individualistic and competitive strategies (Johnson and Johnson, 1974). There is evidence to support the argument that individualistic, competitive systems serve to limit student academic performance and aspirations and to depress satisfaction with school (Coleman, 1968; Johnson and Johnson, 1974).

Educational researchers and developers then should attend to ways of creating cooperative interaction between children for purposes of increasing academic performance as well as for improving interpersonal communication and satisfaction with school. The re-design of the structure of rewards offers one route to attack the problem. There are, of course, other promising alternatives for re-focusing the goal structure of the student social system. The suggestions of Coleman (1968) on between-school competition and of DeVries and Edwards (1973) on team competition and academic games are, for the authors, the most exciting recent proposals on the problem.

In concluding this paper, the authors would like to suggest several topics which they feel deserve high priority in future research on the development and evaluation of cooperative goal structures. Current research in this area is preliminary and at best suggestive. However, answers to some of the following questions should increase our knowledge and understanding substantially as well as lead to better educational systems for our children.

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1. Do extrinsic reinforcers need to be used to develop cooperative goal structures? A better question may be what types of rewards can be used and which ones work best with various classes of students? We may find, for example, that children with a history of failure in school may benefit from extrinsic reinforcers while children who have had more success or who have acquired more skills will acquire sufficient reinforcement from participation in cooperative groups and from appropriate learning materials. Additionally, we need to isolate the effective mechanisms for the delivery of reinforcement to increase cooperative behaviors, such as tokens provided by adults or by children and praise from children and/or adults.
2. DeVries and Edwards (1973) have done significant research on important process variables which occur in group structures. However, further study in this area is indicated. Do children who need the most assistance from others receive less satisfaction and develop negative images of themselves? In what ways do students pressure one another to improve their performance, and is peer influence constructive or destructive in particular cases? Do children ever attempt to sabotage group performance and how can this be avoided? Do cooperative groups lead to greater satisfaction with interpersonal and intrapersonal relations?
3. What skills, i.e., responsiveness to reinforcement, a desire to help people, a certain level of verbal ability, and so forth, are needed to participate in cooperative groups? Do most children have these skills or do they need to be taught?
4. How can cooperative groups be maintained over long periods of time? That

tutoring to indicate whether they continue to exhibit cooperative behaviors in other contexts at later points in time or whether the tutor and tutee maintain the academic gains.

5. Are group structures best for all subject areas or are there subjects which should be handled in another way, with competitive or individualistic structures? In other words, we need to isolate the conditions in which group contingencies work best with what type of curriculum materials. Likewise, (in some subjects more than in others) students may be more effective tutors or may require extensive training in teaching methods to be effective.
6. Is competition helpful between groups or should groups compete against an abstract standard or their own past performance? Should there be no competition of any kind? Can competition be eliminated or simply redirected?
7. What are the effective components of the tutoring process, the friendship bond, interactional behavior, actual instruction in acquisition of skills, reinforcement provided by peers and tutors, feedback, and so forth?
8. Very few studies exist which empirically compare the effects of cooperative, competitive, and individualized structures created by various reinforcement systems. We need more investigations to provide hard data to ascertain the effects of these various structures on essential dependent variables in education.

Partial answers for some of these questions exist in the literature. The time is ripe, however, for large-scale and systematic research on the effects and implementation of goal structures which promote cooperative behaviors among children. There is no greater social problem to be solved than

invidious competition, lack of communication and empathy, and mutual hostility among people. We can begin seeking the solution by teaching our own children how to help one another.

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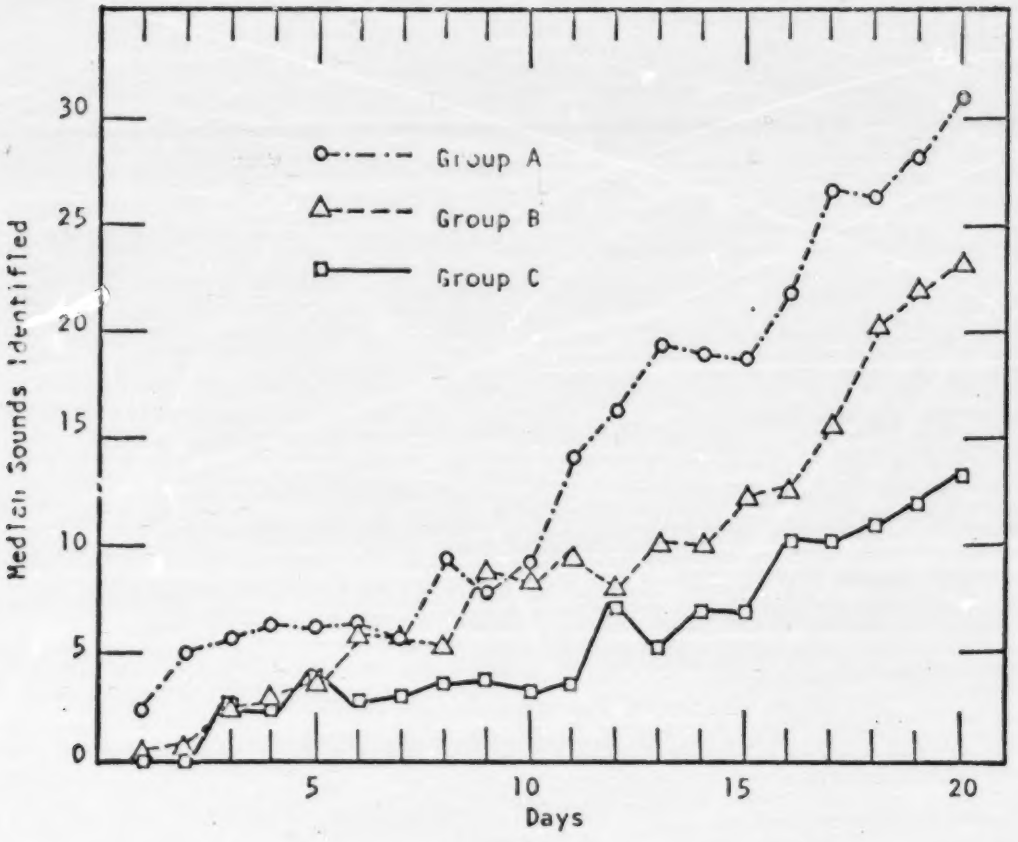
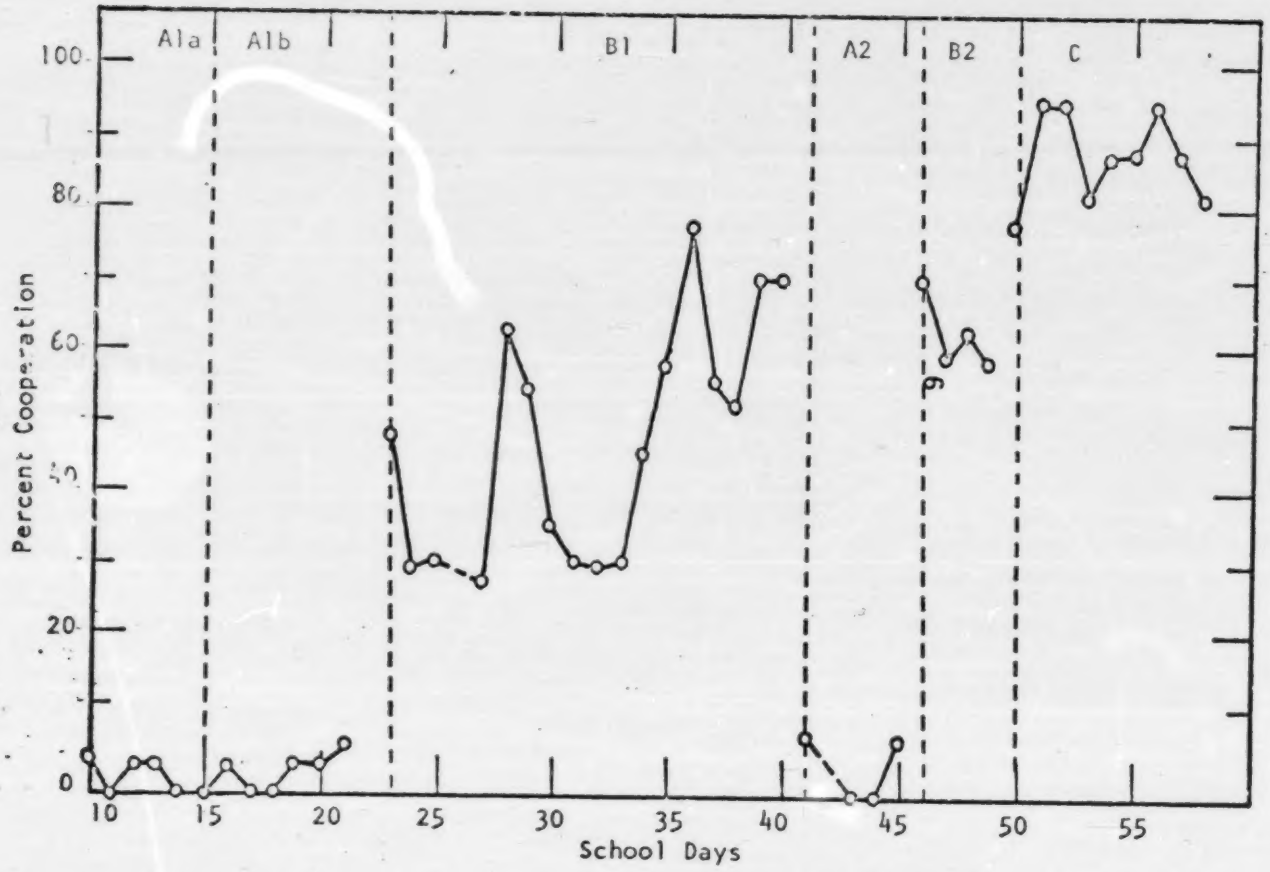
Figure 1



NOTE: Effects of peer tutoring for Group A with material reinforcers for learning sounds, Group B with material reinforcers for attendance, and Group C with no material reinforcers.

Figure 2



NOTE: Median percent of scheduled time spent cooperating at Language Master each school day. (After Pfeiffer, 1969) During A1a wage reinforcement was given for individual vocabulary gains; A1b and A2, for mutual vocabulary gains of cooperating pairs. During B1 and B2, wage reinforcers as in A1b and A2 plus tokens and approval intermittently while cooperating at Language Masters. During C, wage reinforcers as in A2 plus intermittent social approval by instructor while cooperating at Language Masters.

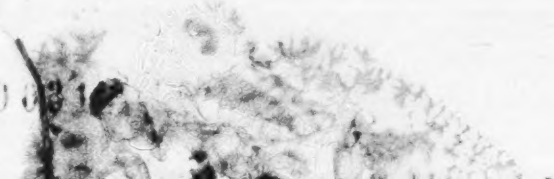
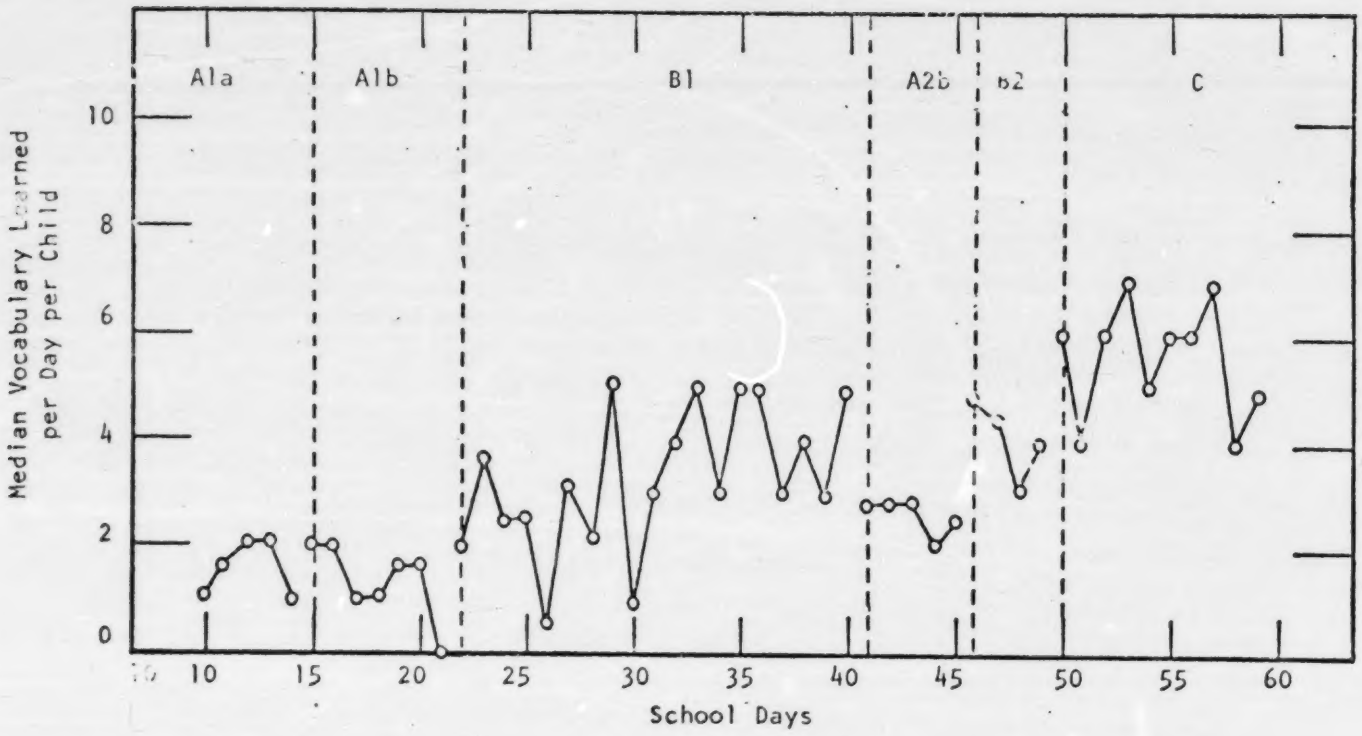


Figure 3



NOTE: Median number of words learned to criterion per child each school day. (After Pfeiffer, 1969.)

Figure 4

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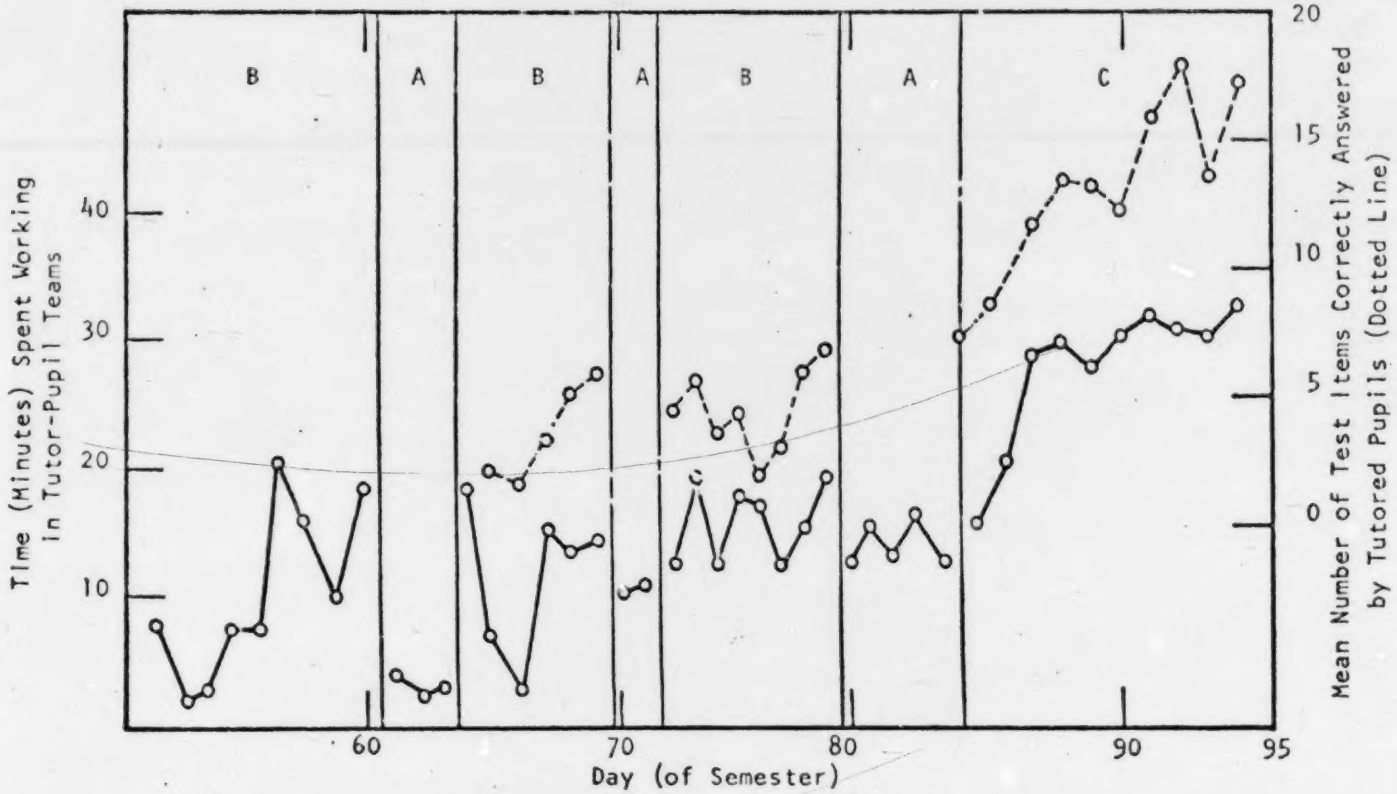

NOTE: Mean time seventeen preschoolers spent studying in tutor-pupil pairs and the mean number of test items correctly completed by tutored pupils, by days through seven experimental periods. In the A conditions the teachers worked a token exchange for studying with a regular token for student-tutor pairs' correctly completing assigned tasks. In B, the token exchange was similar but special tokens worth four regular tokens were given to pairs for correctly completing assigned lessons. C was similar to B except field trips were included in the backups. (After Stoddard, 1970.)

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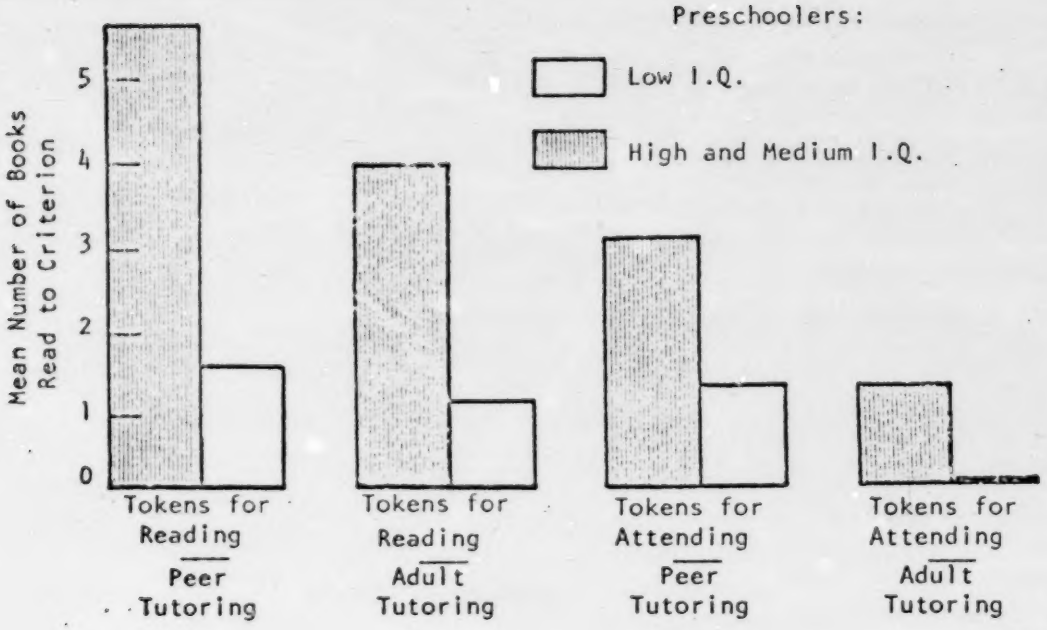
Figure 5



NOTE: The relationship of books read (attendance controlled) to tokens and tutoring by IQ levels. (After J. A. Hamblin, 1970.)

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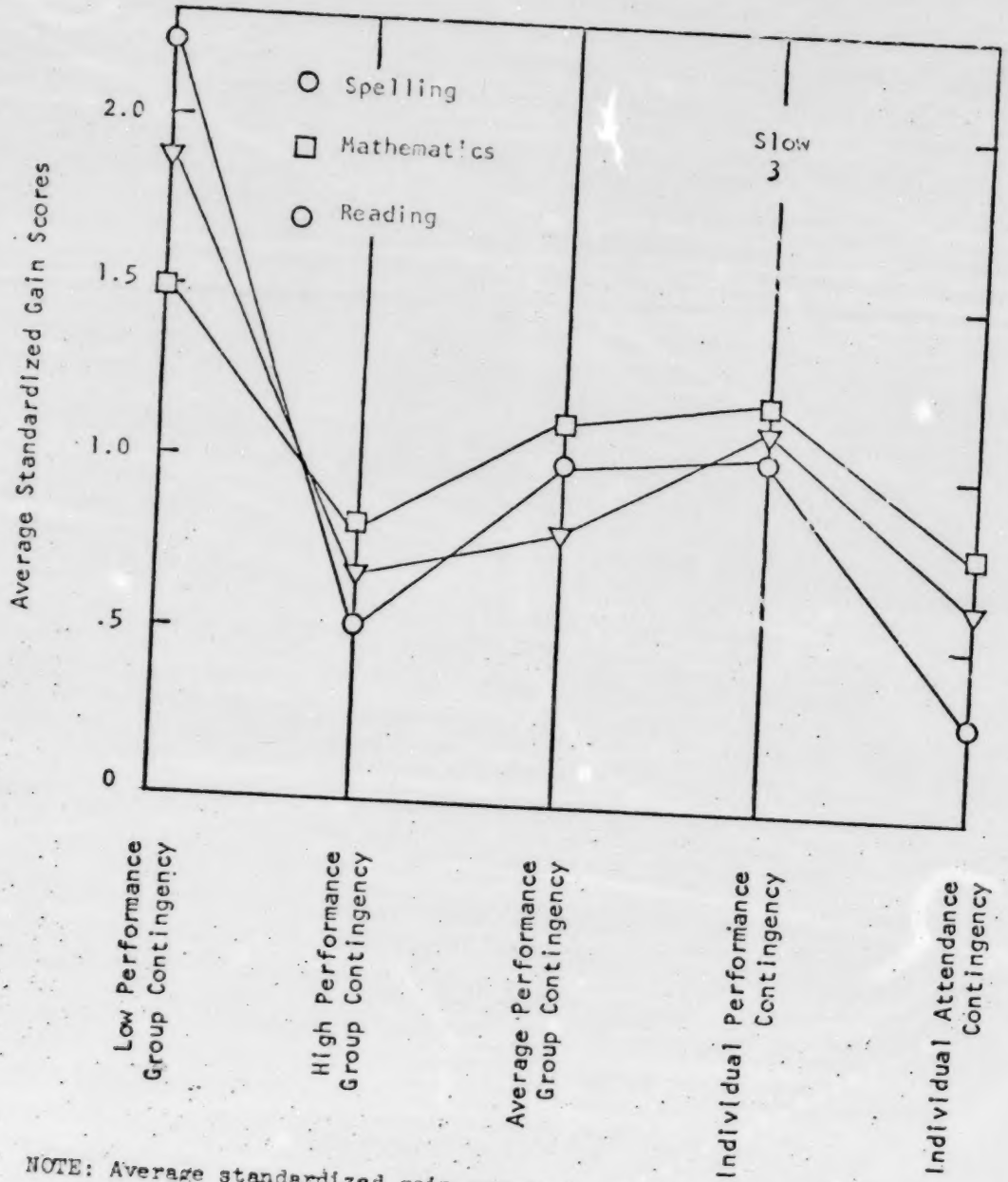
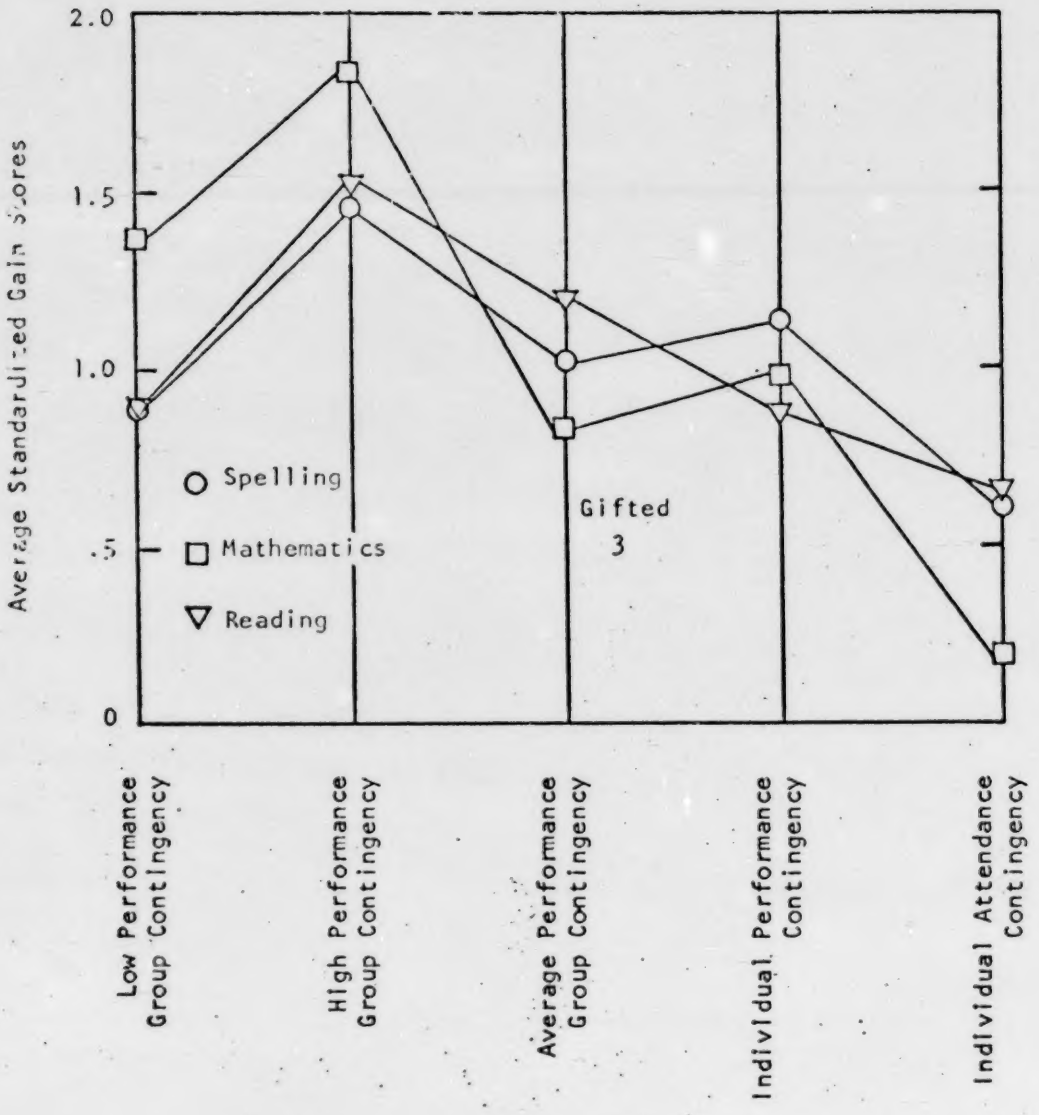
Figure 6



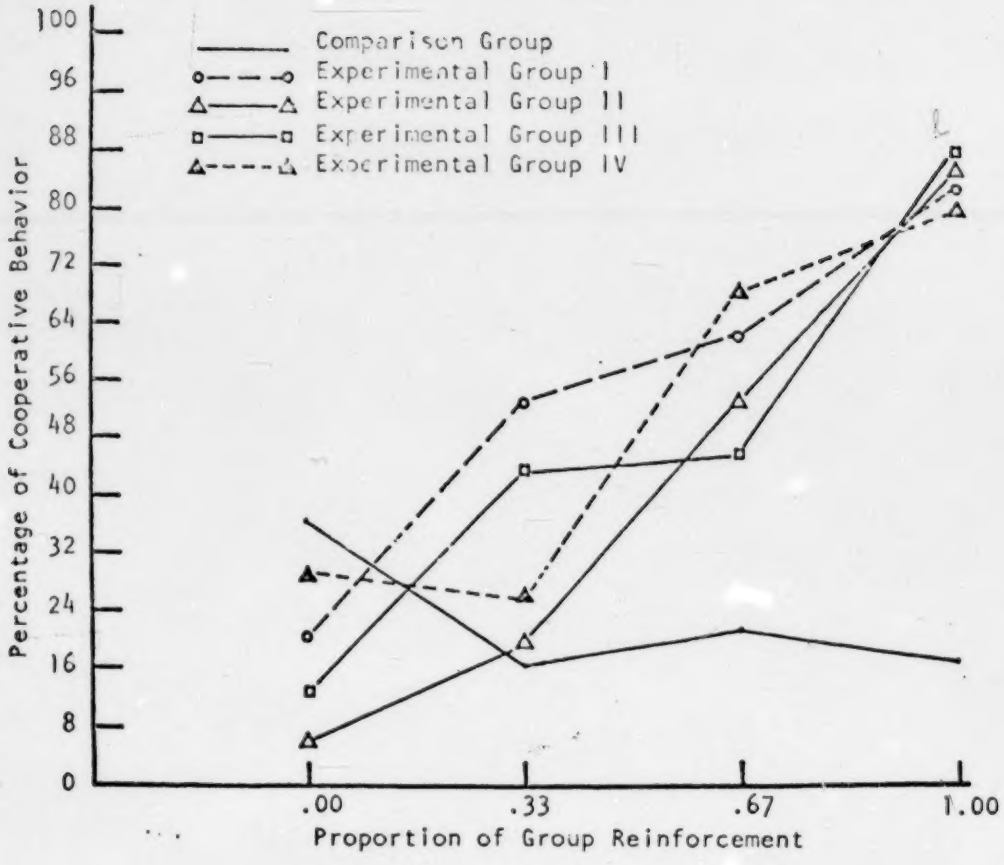
NOTE: Average standardized gain scores in spelling, mathematics and reading for the three slowest students in each experimental group under five contingency conditions.

Figure 7



NOTE: Average standardized gain scores in spelling, mathematics and reading for the three most gifted students in each experimental group under five contingency conditions.

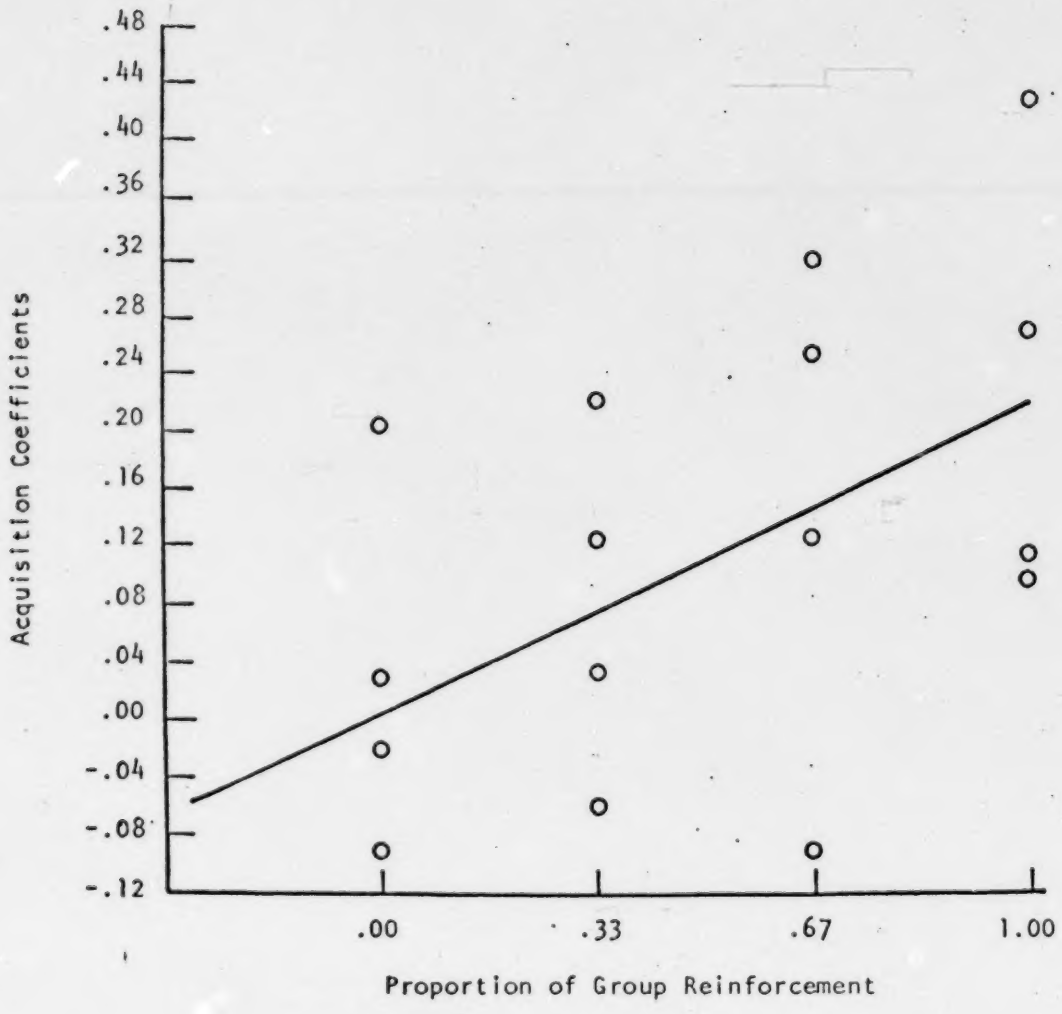
Figure 8



NOTE: Percentage of cooperative behavior for each experimental group plotted against the proportion of group reinforcement composing a contingency.

Comparison group provides a baseline for entire period of the study. The four values are for each consecutive 14-day segment of the experiment. The plotting of the means of the 14-day experimental time segments results in percentages of behavior.

Figure 9



NOTE: Least-squares regression line for the coefficients for the whole group plotted against the proportion of group reinforcement composing a contingency.

In contrast, the acquisition coefficients for the comparison group for each consecutive 14-day segment of the experiment were-.07, -.01, -.06, and +.05.

TABLE 1

UNIVARIATE ANALYSIS OF VARIANCE
OF READING COMPREHENSION MEASURE

Source	df	MS	F	P
Factor A (Reinforcement)	1	276.14	14.85*	$p < .001$
Factor B (Tutoring)	1	85.55	4.60*	$p < .05$
A X B	1	28.75	1.55	$p > .05$
Within cells	36	18.59		

*F-ratio significant at least at $\alpha = .05$ level

TABLE 2

UNIVARIATE ANALYSIS OF VARIANCE
FOR MEASURE OF TUTORING BEHAVIOR

Source	df	MS	F	P
Factor A (Reinforcement)	1	21,390.62	254.65*	$p < .001$
Factor B (Tutoring)	1	1,946.02	23.17*	$p < .001$
A X B	1	133.23	1.59	$p > .05$
Within cells	36	84.0		

*F-ratio significant at least at α = .05 level